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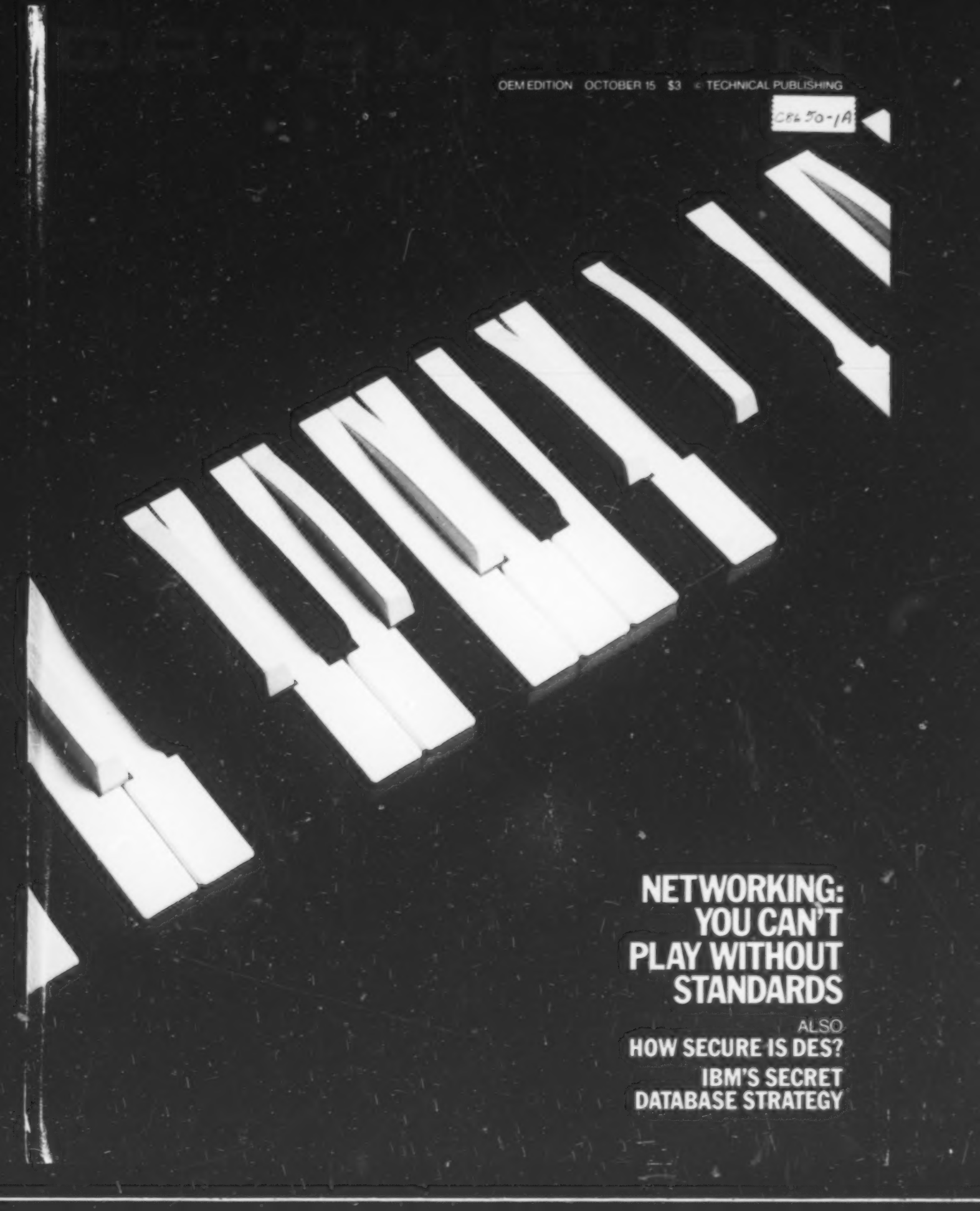

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IBM'S SECRET DATABASE STRATEGY

DATAMATION

OCTOBER 15, 1985/$3 U.S.A.
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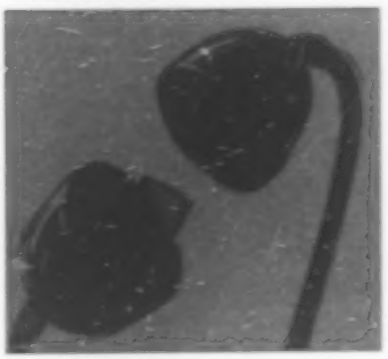

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COVER PHOTOGRAPH BY WALTER WICK

OEM EDITION

Sales of peripherals, supplies, and upgrades to existing customers represent up to 40% of revenues.

MINING THE AFTERMARKET

by Esther Surden

"It's a very big market opportunity for oems, and I don't know that we've done as good a job—or that our [resellers] have done as good a job—as we really should have. If handled correctly it can be a very profitable piece of the business—even 30% to 40% of an oem's or var's sales. It's an area you should be able to sell very easily and there should be good profit in it."

Richard A. Farwell, director of the Systems Supplier Program, Information Systems Division at Data General Corp., is talking about aftermarket sales—sales of peripherals, terminals, add-ons, supplies, and upgrades to existing customers. It's a business that minicomputer vendors and others are just beginning to address. And it's a business that vars and systems houses have been trying to find on their own, like prospectors looking for gold. For the most part, they like it just that way.

Says Terrell B. Jones, general manager of Dallas-based American Airlines Agency Datasystems, a Data General var: "We may be kind of unique but we don't use DG's sales force on the initial sale or on the follow-up, so they are not really involved in assisting us. We are out there on our own but that's our choice." Adds James Manion, vp of sales, Ask Computer Systems, Los Altos, Calif., "Hewlett-Packard either supports us or fights us for the same business." Steven Blackman, director of marketing, TEC Computer System, Newton, Mass., notes, "In the past, Digital Equipment Corp. tried to support our user base and sent out hundreds of pieces of information. Our clients asked us to get them off DEC's mailing list. It's too confusing."

Blackman points out that there are two segments to an aftermarket: 1) the sales of terminals and peripherals and additional software after the initial sale; and 2) the sale of a completely upgraded system. Like his colleagues at Ask and Agency Datasystems, the DEC var's marketing executive sees the creation of new applications or the evolution of existing applications for the customer base as an excellent way to drive aftermarket sales.

Those sales, according to a recent Yankee Group survey, are booming for oems and their vars. The Boston-based research organization surveyed 1,189 integrators, oems, and resellers last March and found that 34.2% of their customers came back for another system within two years of the initial sale; 36.7% bought more main memory; 44.6% bought additional workstations; 38.1%, more disk drives; 37.1%, additional printers; 25.8%, more modems; 23.6%, local area network hardware; and 65.5%, additional software (see Fig. 1). That software upgrades were the most popular repeat item didn't surprise the analysts: most vars address vertical niche markets ignored or left to them by vendors. Software is also the most lucrative aftermarket category, bringing in a 47.1% margin, according to those surveyed.

Just how profitable aftermarket sales are is largely a matter of how much effort is being put into follow-up and how much administration is needed. It's also a function of the length of time the equipment base has been installed and the number of systems an oem has in the field. Vars reported to Yankee Group that they made an average of 26.4% profit margin on cpus, 25.4% on local area networks, 26.9% on sales of disks, 25.6% on printers, and 25.8% on terminals.

The aftermarket is very important to American Airlines Agency Datasystems, for example, which has some 1,400 Data General cpus at travel agencies. Agency Datasystems' Jones cautions, however, that relying on this kind of business is a two-edged sword. Although upgrade business is good, he says, it takes a great deal of time: "In fact, I've recently had to tell some of our sales people to cool it a little bit on the upgrades and go back to doing initial sales.

KEEPING TRACK OF CUSTOMERS

"You have to keep very accurate records of what the customer has," Jones explains. "When a customer calls and says he'd like to add another terminal, you get into a lot of configuration issues. Does he have enough [multiplexed] lines? Does he have enough power left in the system to add another board if he needs to do that? Figuring out what he needs can take a lot of time." The effort pays off though, Jones adds. "It's profitable, there's no question that it's profitable, but I guess if I had to do it again—and we've been in this business 10 years—I wish we had a better set of extremely accurate records of what everybody had."

Agency Datasystems performed some 35 systems upgrades for customers last year and sold about 350 crts, 280 printers, 25 disk drives, and 12 tape drives to its already existing base, says Jones.

The Data General var handles field service dispatching for the manufacturer. Customers call Agency Datasystems, which refers maintenance to DG and then the var performs the billing for the oem, according to Jones.

"As the older systems become more expensive to maintain, they do an automatic selling job for us. We did a targeted mailing to customers that compared their cost of maintenance today with an upgraded system to show them that cost of ownership would actually go down," he says.

At Ask Computer Systems of Los Altos, Calif., add-on equipment sales make up about 20% of the company's total business. The firm currently distributes both Hewlett Packard and DEC equipment with its own manufacturing software, with HP equipment accounting for about 80% of the firm's 900 installations. "We have two programs to zero in on in this market," says Ask's Manion. "Product managers for the hardware take the information they get from the vendors and disseminate it to the sales force. In addition, we've put together a group of people we call installed base reps. If HP or DEC comes out with a new disk drive, we give the reps responsibility for getting that information out to our customer base and following up on it."

TEC Computer Systems, with 100 systems in the field, sees no need for a concentrated effort to contact its installed base, says Blackman. "We're a service company—not a hardware company—so we are in contact with our base all the time." TEC does sponsor a yearly users conference to

PHOTOGRAPH FROM THE BETTMANN ARCHIVE

Software is the most lucrative aftermarket category, bringing in a whopping 47.1% margin.

allow it to share information with its users, and distributes a quarterly newsletter that keeps users up-to-date on events, including the introduction of new DEC hardware.

For their part, the manufacturers are just beginning to address the aftermarket needs of their resellers, mainly in response to var clout. Sums up Wang director of var marketing Frank Girard, "As the var sales channel becomes a more significant part of our business, we find they want to be treated just like we treat our own sales people. Typically, we like to take the initiative, but in this case the resellers have been very active and vocal."

Vendors have come up with a variety of programs that attempt to meet var requirements in the aftermarket. DEC, for example, is pushing a program instituted in May called Fastship. According to Bruce Rollinson, group marketing manager for peripherals and supplies, DEC now sends out a menu of selected peripherals to vars and end users. If the item needed is on the Fastship menu, shipment takes place within 72 hours, and delivery is made directly to the var's customer.

"Before, vars had to actually inventory large quantities of peripherals, communications products, or memory products. Now, when they have emergency situations, they can call us for direct delivery of products on that menu," says Rollinson. Vars are given their normal corporate discounts, he notes, and the only limitation on the program is maximum order size. "In other words, they can't order 100 or 1,000 through Fastship, but they could order three. Rather than having to place a purchase order with DEC and wait for the normal flow of purchase orders to be processed, they can now just pick up the phone and get a quick delivery."

JONES OF AGENCY DATASYSTEMS: Preferring to look for its own gold mines, this American Airlines unit is out there in the aftermarket on its own by choice.

PLEASED WITH FASTSHIP

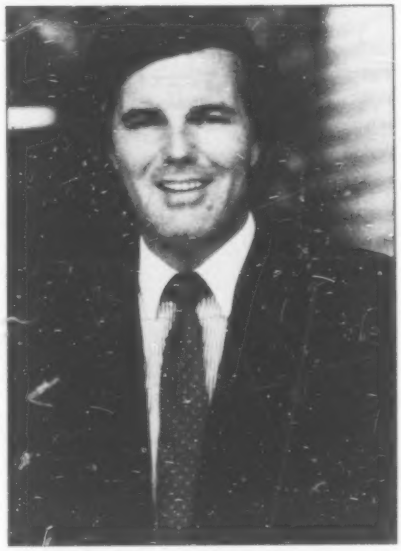
DEC var TEC Computer Systems has used Fastship since its introduction and generally is pleased with the benefits. "It's been helpful in allowing us to reduce inventory," says Blackman. "We used to have a couple of hundred thousand dollars worth of inventory that we don't have now. We use [Fastship] to accelerate the shipment of a system. We order the cpu and memory through ordinary channels and try to use the fast shipment program to get everything added to it."

But while DEC says it will ship within 72 hours, Blackman points out that an item doesn't necessarily get sent the fastest way. While the terminal might be placed on the truck within the stated time, it might not arrive at the customer's doorstep so quickly. And some crucial items aren't on the program, Blackman reports. If a customer wants to expand, for example, he might be able to get the backplane and cable, but his var might have to order the expansion box through ordinary channels—a silly situation in which things don't come together the way they should, he says. Skeptics suggest that the DEC Fastship program is just another way for the company to reduce crowded inventories.

Similarly, Data General has its DG Direct program and Wang its Wang Direct operation. DG Direct allows resellers to set up a blanket agreement for a certain volume of product, according to DG's Farwell. "A discount is applied based on the volume of product. The reseller works with the DG Direct organization to set up what is, in effect, a joint marketing program where customers can call the var for the products and services listed in the catalog," Farwell explains. Hardware offered through DG Direct includes the portable Data General One, Desktop systems, and Dasher terminals. Delivery is normally two to five days, says a DG spokeswoman.

Wang's independent sales organization has just been given a charter to participate in its aftermarket program. The company's Girard describes Wang Direct as a "very quick turnaround order mechanism for getting terminals and disk drives and items of that nature." Vars will be able to place orders over a hotline, from a catalog, or from other "mail pieces that promote certain items."

One aggressive user of Wang's fast



MANION OF ASK COMPUTER SYSTEMS: Special reps keep end users up-to-date on vendor equipment, generating sales of add-on gear.

delivery marketing scheme is Informatics of Rockville, Md. In business since 1976, the legal system marketer has 250 installations and has instituted an active program to develop its aftermarket. Says Mary MacPherson, director of marketing at Informatics, "Right now aftermarket sales are about 50% of our business." Informatics has a telemarketing program set up in Phoenix and also uses direct sales for upgrades. "We try to get our customer used to dealing with a group assigned geographically but based in Phoenix."

Explains Patty Lane, one of Informatics telemarketing directors, the var can call in to a special phone number at Wang and "on the 4230 workstation and Professional Computer line, Wang guarantees us a 10-day turnaround on shipping time."

In turn, Informatics allows its own customers to call in over the phone, writes up a supplementary order right away, and amends the customer's contract immediately. While Wang is filling the order, the customer is returning his copy, so the equipment can arrive at the user's door quickly. Fast turnaround is essential to Informatics' business. "Personal computers and workstations are really hot items, and when people order them, they need them right away," Lane says. "The competition is on street corners these days." Adds MacPherson, "In many cases our customer could go to someone else and pick up equipment that day or the next day. That's why it's important we expedite the order."

Discounts based on volume alone give the var more flexibility to buy the specific product he needs.

GIRARD OF WANG: The manufacturer finds vars "very active and vocal" in wanting a piece of the aftermarket.

Changing the way discounts to vars are handled can also aid in aftermarket sales, says Farwell of Data General. "Discounts across the corporation tend to be based on dollar volume or quantity of product. In fact, we are tending to move more toward the volume of business approach because that gives the customer a lot more flexibility to buy our product line—to buy the specific product he needs as opposed to a quantity of a particular kind of product."

IDENTICAL PROGRAMS AT HP

At Hewlett-Packard, aftermarket support is considered less important than making sure that the programs offered resellers are identical to the programs provided to the direct sales force. Explains Jim McDonnell, manager of HP's commercial third-party program, "If we have a special incentive program for upgrades, we announce it simultaneously through all of our sales channels, so we do not hinder our resellers or give them any less advantage than our own HP sales force. They get all the sales tools and training manuals that are available to the direct force. And new products are announced through the entire sales organization."

HP has set up a special marketing relationship with some of its vars, however. "Hewlett-Packard, up until a few years ago, really didn't have too much focus on working with third parties. But HP decided about two years ago—which coincided with the time we became a public company and were putting our marketing program together—to really cooperate with their third parties," says Bob Carroll, executive vice president of Richardson, Texas-based CompuTrac Inc. Today the hardware manufacturer has more than 450 third parties worldwide. The nine-year-old var has a very close formal relationship with HP. The vendor, which performs hardware maintenance for CompuTrac, lists the company in its National Program Directory as one of 18 prequalified var and software suppliers. Further, Carroll says, HP will generate sales leads on existing accounts for the reseller, and generate new sales leads as well.

This cooperation is especially important for CompuTrac, which has 150 installations in the legal field but only three direct sales people. Included in the feedback is information on which customers are ready to be upgraded from the HP 1000 to the 3000, a big-ticket item.

Aftermarket business is about 20% of the firm's total revenues right now, Carroll explains. But the var expects to place more emphasis on the area as soon as support staff are trained. Until now, "we've only done blue bird business, where people call in and want to add something, or where HP sees a need," he says.

IBM has had a reseller program for only five years, and a value-added distribution system since the introduction of its Personal Computer. Although an aftermarket can develop in a short time, Big Blue apparently hasn't given much thought to any extra help its vars and vads might need to mine this field's potential.

"IBM's marketing support for vars includes a national on-line prospect referral system, technical assistance, maintenance for selected products, sales and business training for managers and staff, consultant seminars, promotional literature, business shows support, advisory counsels, and opinion surveys," reads a statement.

Company spokesman Rick Bause adds that IBM direct sales staff has frequent contact with var end users. What happens when IBM perceives a need for an upgrade, say, in a shop that has a System/36 and is ready for a System/38? "It depends," says Bause. If the var is a "System/36 only" reseller, then IBM direct sales would get the upgrade business. If the var can deal in both machines, then IBM would probably refer the account back to the reseller.

Typically, IBM vars and vads haven't been in business long enough to feel the effect of Big Blue's upgrade strategy. For example, IBM vad Technical Marketing Systems, in business since 1983, goes after seven vertical markets including churches, real estate offices, and attorneys. Says Susan Hassell, marketing manager for the Nashville-based concern, "Most of our business is in the vertical hardware/software initial sale as opposed to follow-ups."

The manufacturers tend to place varying degrees of emphasis on the need to provide supplies to resellers. Says Hewlett-Packard's McDonnell, "Most of our vars don't really mess with supplies a whole lot. Most people who buy large volumes of those things wind up cutting their own deals locally." Generally speaking, HP vars aren't set up to handle orders that tend to come in high volumes, low dollars, and small pieces, says McDonald. Agrees CompuTrac's Carroll, "When you get into a volume business like supplies, it's not worth your while to administer it."

Adds Yankee Group market analyst Michael Goulde, "Vars usually handle supplies as a matter of convenience to their users." Statistics show, however, that there is a markup in the suppliers area of 30.1%, second only to the profits for software.

DEC'S ADVANCED PROGRAM

Recognizing the potential profit to be made, DEC instituted what it calls a "very aggressive program" to support its vars with supplies. "We offer resellers supplies agreements that allow them to make appropriate margins—from 28% to 40% depending on the item—so they can go out and sell supplies to their customer base," a company spokesman says. DEC also provides its vars with a catalog listing all supplies products and will preprint the reseller's name on that catalog so that customers will go back to

CARROLL OF COMPUTRAC: This var depends on its oem for sales leads on existing and new accounts.

"Vars usually handle supplies as a matter of convenience to their users.

the var rather than the manufacturer.

Similarly, Data General works with vars to allow them to set up their own DG Direct programs in which "their customers can call them for paper, ribbons, diskettes, cartridge tapes, and so on. [The resellers] then have a blanket agreement with DG so they can get those products on a timely basis," DG's Farwell explains.

The Wang Direct program also encompasses supplies, Girard says. A supplies catalog will be offered to vars. In the past, when this service was provided to Wang's own customers, "90% of our orders went out of the door in 24 hours or less. And 95% were in the customer's hands within five days of receipt of the order," Charlie Laing, director of Wang product marketing, boasts.

Data General, for one, has placed a great deal of emphasis on getting information out to its vars. At its annual Systems Supplier Conference this month, the firm is sponsoring a seminar on how systems suppliers can develop the aftermarket. What will the oem tell them? "That it all stems from system support. I think a lot of our vars have not believed that they needed to continue relationships after the system was installed. They believed they could leave the servicing of the hardware to DG and go out after new business," says Farwell. "But for a minimal amount of cost, we can help them keep their customers informed and help them maintain visibility with those customers." DG can supply resellers with consultation, brochures, and newsletters with articles and pictures oriented toward the resellers' particular markets.

An information campaign is an important part of Wang's strategy, too, says Girard. "We are very close to moving 20% of our hardware through independent sales organizations. While this is weighted to new installations, for some of our established resellers with a large customer base, as much as 50% of their business is in the form of upgrades and add-ons."

Wang sends its resellers a bimonthly publication called *Var Flash* that shows them new prices or new product offerings. If there is a sudden change in pricing or a new product release, Wang sends out a *Var Gram*, an overnight letter, so that the resellers can begin to promote the product "pretty much in sync with our own sales organization," Girard says.

None of the vars contacted for this article felt left out of their vendor's information flow. Sums up Ask's Manion, "We get our information almost as promptly as the direct sales force does."

Hindering the aftermarket, Jones of Agency Datasystems points out, is poor resale value for items already out in the field. In response, his firm is trying to set up its own program to help its users donate some of their used equipment and get a write-off. Wang, for one, has taken an aggressive stance on this issue. In order to encourage resellers to upgrade their customers to Wang's VS100, the firm devised an incentive program that gives computer owners the ability to trade in their VS80 minis through their vars. Wang either offers vars a fixed trade-in allowance of $6,500, which is good toward the purchase of add-on equipment, or a varying schedule of allowances based on what's being traded.

Explains John F. Deutsch, marketing manager for var business development at Wang. "If you are going to buy a disk drive that has a value of $12,000 retail, the first thing the var would do is take a regular var discount, which ranges from a low of 12% to a high of 36%. With 30% as an average, the cost would come down to $8,400. Then he could take $6,500 from that, so the cost of the disk drive to the var would be $1,900." Or, he adds, the var could take its 30% off the average price of a VS100, say at $100,000, yielding a price of $70,000. If the var is trading in a 384K VS80, "we are giving him an allowance of $10,140. He's buying that system for about $60,000." For resellers to pass on the savings to customers, title to the system has to be passed back to the var. Deutsch says, "You can't trade in what you don't own."

FIG. 1

AFTERMARKET OPPORTUNITIES

How to read the chart: 40.2% of var customers bought more than one system at the time of initial purchase; 32.2% returned to the var within two years for an additional system or upgrade.

	AT INITIAL PURCHASE	RETURNING WITHIN TWO YEARS
Another System	40.2%	32.2%
Main Memory	79.0	36.7
Workstations	70.4	44.6
Disk Drives	83.6	38.1
Printers	82.9	37.1
Modems	51.8	25.8
LAN Hardware	29.1	23.6
Software	89.2	65.5

Source: The Yankee Group. Based on survey of 1,189 systems integrators, oems, remarketers, and value-added dealers and resellers

THE VARS' POINT OF VIEW

Despite vendors' good intentions to help their resellers clean up on the aftermarket, vars have their own points of view, born out by Yankee Group statistics. Resellers consistently rate product features as very important in selecting a supplier for peripherals, but goodies like cooperative advertising, training programs, availability of third-party software, and direct service to the end user tend to come in last. The Yankee Group survey lends credence to the notion that many vars view vendor support more as interference then help.

Says Ask's Manion, "The only thing that the vendors could be doing that they're not doing is to stop trying to compete with us for the same market. If we sell an account that is buying our software and their hardware through us, we'll find a lot of times that the DEC rep or the Hewlett-Packard rep is going after the same add-ons business," he adds. "They force us into discounting more than we'd like."

Agency Datasystems' Jones suggests that the vendors could develop products as add-ons to older equipment "that would be good for both of us." Acknowledging the vendor's strategy to move on to new technology, Jones points out that there are some users who just won't move to new machines, but "they might move to a new terminal or disk drive or printer if it were backward compatible. Sometimes you have to help a guy out to the next step."

Officials at San Jose's Altos Computer Systems, which supplies multi-user systems and works only through var channels, say aftermarket sales represent about 15% of their business right now. Its strategy to help sales in the aftermarket is nothing more than providing a long-range upgrade path, so its system will grow as the customer grows.

Tom Anthony, vice president of reseller sales at Altos, says, "What we normally do is make sure our systems are designed so that they are flexible enough and easy enough to upgrade in the field so we don't cause any traumatic experience to the end user as a result of his need to upgrade." ◉

Esther Surden is a Guttenberg, N.J.-based writer who has specialized in the computer industry for 12 years.

Educators demand greater product sophistication as the market matures.

COMPUTERS IN THE SCHOOLS

by Edith Holmes

The year 1983 marked a turning point in the education market for personal computers and software. In that year, the industry saw a tremendous surge in the number of public elementary, junior, and high schools using the technology: microcomputer use spread to 90% of the nation's school districts from 40% the year before. Clearly, computers in classrooms were no longer "a fad, a flash in the pan," says Anne Wujcik, director of educational research for Talmis, a New York-based subsidiary of International Data Corp. All of a sudden, "we weren't talking about schools pioneering in this field anymore, but about getting on the bandwagon."

Since then, the micro population in the schools has more than doubled, from 291,000 units in June 1983 to 630,000 units in June 1984. By the close of the 1984-85 school session, Talmis found more than 1 million personal computers in place (see Fig. 1), and these figures do not include the micros being used in private schools or by college students. Meanwhile, the market for educational software to run on these machines is growing by leaps and bounds—increasing from $43 million at the end of the 1982-83 school year to $97 million at the close of the 1983-84 session and reaching roughly $150 million by June 1985.

As the number of micros has increased, so has the sophistication of the educators. Teachers and administrators are demanding an increased level of support from hardware manufacturers and innovative programs from software publishers. As a result, drill-and-practice math programs are no longer enough; hardware that does not accommodate a sizable software library is out of the question.

The vendors making pitches to the schools include the key hardware manufacturers in the business and home markets and more than 100 software publishers. Market researchers believe that those that will come out on top in hardware are Apple Computer Corp., Commodore International Ltd., and IBM, while Tandy Corp. loses market share, Atari Corp. struggles to retain its installed base, and the American subsidiary of Britain's Acorn Computers Ltd. virtually vanishes from the United States' education market.

FIG. 1

COMPUTERS IN U.S. SCHOOLS, GRADES K-12

YEAR	NUMBER OF MACHINES
1981	33,000
1982	125,000
1983	291,000
1984	630,000
1985	1,075,000 (estimates)
1986	1,550,000
1987	2,000,000
1988	2,400,000
1989	2,850,000

...AND HARDWARE IN PLACE AS OF JUNE 1984

COMPANY	MARKET SHARE (%)
Apple	48
Tandy (Radio Shack)	19
Commodore	18
IBM	5
Texas Instruments	4
Atari	3
Other machines	3

Source: Talmis

Where software is concerned, smaller program publishers who ally their firms with Apple or IBM or one of the major educational textbook publishers—among them Addison-Wesley, Milliken Publishing, Random House, Scholastic, or Holt, Rinehart & Winston—should do well. Companies forging such alliances or already enjoying a reputation for quality educational software include The Learning Company of Menlo Park, Calif., and Sunburst of Pleasantville, N.Y.

Cupertino, Calif.-based Apple led the way in the education market and today dominates the hardware field with a 54% share (see Fig. 2). "Apple has continued to consolidate its position in the school market. For the short term, the company has no competition," comments Wujcik. Talmis estimates that Apple captured 65% of the 1984-85 kindergarten through twelfth grade (K-12) sales. Further, adds Wujcik, "the schools tell us that as much as 70% of their 1985-86 purchases will be with Apple."

Battered by its dealers into retreating from a direct sales assault on IBM in the business market, Apple has reaffirmed its commitment to the schools, returning some of its salespeople to the education market. The company also hopes that sales to students will translate into sales to their parents. Apple's education sales manager, Michael Mount, cites research suggesting that for every micro sold to a school, four additional machines are sold into another market, such as the home or a small business.

Aiding Apple in its pursuit of this market is the huge list of third-party education software programs—more than 2,000 titles—written for the Apple II family. Indeed, most new education packages are developed first for Apple's machines. Educators also applaud the compatibility the company has maintained between the Apple II, the II Plus, the IIe, and the portable IIc. The company offers schools discounts

Hardware that does not accommodate a sizable software library is out of the question.

that range from 20% to 40% depending on the volume of the purchase and the age of the product. Apple also sells 10-copy packages of some of the more popular education software, such as Apple Works, Scholastic's Bank Street Writer II, and Southwestern Publishing's Alphabetic Keyboarding.

ON-SITE TRAINING AVAILABLE

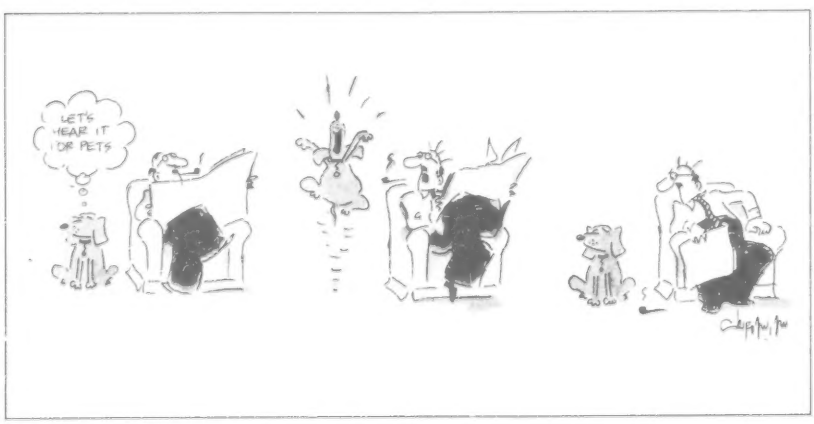
Schools interested in buying Apple's products place their orders directly with the company and designate local dealers with whom they wish to do business. Acting on Apple's behalf and paid by the firm, the dealer is then responsible for equipment installation and training. Apple makes training rooms available in its various sales offices to ensure that key administrators, supervisors, and teachers know how the equipment they have purchased works. On-site training and assistance can be had, too, revealing Apple's recognition that this market requires special handling. The company just completed a six-month Teacher Training Scholarship program in which 10,000 instructors received a total of $100,000 to take courses to help them integrate micros into their classrooms. "You don't sell to the education market and then walk away from it," says Mount.

Currently holding second place with an 18% share, West Chester, Pa.-based Commodore will work hard to maintain its piece of the market, according to Talmis. "The Commodore 64 sold adequately in 1984 and 1985, but the schools did not flock to it," says Wujcik. "The software supply for the machine is just not that exciting." Further, the company has made a point of offering neither free services nor volume discounts to the education market. Instead, the firm's basic philosophy is to sell all of its computers at a low price.

Though attracted to Commodore's low prices, educators have damned the firm for failing to make its Vic-20 micro compatible with the Commodore 64. The company appears to have taken such criticism to heart. "Schools want and need products that will work with what they already have. Our new Commodore 128 is totally compatible with the Commodore 64," says Patricia Walkington, manager of education marketing. In addition, the machine has a CP/M option, enabling users to run the many educational packages available with that operating system—including advanced languages, such as Pascal, that are so popular in the high schools. At $969 with a single disk drive and a color monitor, Walkington believes that the Commodore 128 is "extremely competitive" with comparable equipment from Apple and IBM. Production of the 128 has begun and will keep pace with orders, according to the company.

Talmis feels that by selling the 128 to the education market, Commodore will maintain its position in the schools. In fact, the company sees education as a primary market for its new machine. Says Walkington, "We are marketing the 128 to the secondary schools, particularly those getting into computers for the first time."

Losing out to Commodore for number two and now in third place in terms of market share, Tandy Corp. of Fort Worth appears to Talmis and other market researchers to have lost momentum in the education market, perhaps because of Apple's continued success and IBM's strong 1984 entry into this field. Understandably, William Gattis, vice president of Tandy's education division, disputes their findings. "None of the market researchers agree, and the variations in their figures are not minor," he says. "We're number one in a number of state department of education surveys." Gattis warns software publishers about making business decisions based on faulty market research figures.



CARTOON BY VAHAN SHIRVANIAN

Tandy's biggest seller in the schools is its Radio Shack TRS-80 Model 4, which includes a good bit of software, a lower price as of the beginning of this year, and Network 4, a high-speed classroom network. But the firm is also beginning to sell its IBM-compatible Model 1000 to this market and last June cut the computer's price to a more attractive $999. "Though it won't replace the Model 4 in the schools," says Gattis, "we think the population of 1000s will grow in the next few years."

The firm's in-house software development team has designed more than 145 programs for the classroom and has over 100 packages on its drawing boards. In addition, the firm has joint product development efforts and marketing agreements with over 80 educational publishers.

Tandy also has made training a key part of its sales effort. Over the past three years, the firm has helped more than 400,000 teachers at Tandy-equipped schools to become computer literate at no additional charge. Regional education coordinators work full-time with the schools, conducting seminars, workshops, and in-service training. Tandy's 450 computer centers across the country also offer courseware preview libraries, which permit teachers to see educational programs and documentation before they buy. The firm has a toll-free hot line for after-sales assistance to the education community.

MICRO BASE IS AT RISK

Atari Corp.'s financial woes have threatened its 2% base of micros installed in schools. Talmis contends that Atari failed to sell any of its personal computers to the education market in 1984 and 1985 and that schools with Atari equipment have had no support for nearly two years. Indeed, school districts report they are having difficulty getting spare parts.

Purchased over a year ago from Warner Communications Corp. by Jack Tramiel, Commodore's ousted founder, Atari may attempt to win the schools back with its new ST computer line, "but the company has to do a lot of fence mending with educators," says Wujcik of Talmis, "in addition to rebuilding its distribution network." Officials at the Sunnyvale, Calif., firm will say only that they intend to market their products to the education field.

Lumped in with "other machines," Acorn Computers' $995 micro is judged by all to be a very powerful machine for the money. But industry observers say Britain's 8-bit, 2MHz 6502 processor-based personal computer with built-in 32K RAM and

"You don't sell to the education market and then walk away from it."

ROM, memory expansion interface, music and speech synthesis, BASIC, word processing, parallel and serial ports, eight display modes, and networking capability just hasn't sold educators.

Acorn, which has a repertoire of 500 software titles and a 10-week course for teachers, is losing money in the U.S. market and has been rethinking its presence here. Indeed, the company completed a $19.5 million financial restructuring earlier this year, which included the purchase by Italy's Ing. C. Olivetti of 49.3% of the company for $11.2 million. Olivetti upped its share of Acorn to 80% in August. Key to Olivetti's involvement is its financial muscle and its promise to help Acorn crack overseas markets such as the United States.

Meanwhile, Frank Murphy, director of marketing, gives every indication that the company's Woburn, Mass., unit will continue in this country, primarily in the education market. This year, he says, Acorn will stress networked software, with programs that can be correlated with its textbooks. Murphy acknowledges that, because of the sophistication of Acorn's product, "we tend to do much better with people buying for the second time." Wujcik no longer considers Acorn a major player in this market, however. Sales for 1985, Murphy admits, are "relatively flat," but he hopes that Olivetti's new commitment will improve Acorn's negative financial image.

Still toward the bottom of market share charts, IBM is believed by all to be a comer in the education field—though not immediately. Some estimates put IBM's share of the market within the next two years at 15% and call that figure conservative.

In the summer of 1984, IBM expressed its "commitment to the education marketplace" by unveiling a good bit of software designed for education. Through its Entry Systems Division, the firm formally announced the Writing to Read program, a language laboratory built around the PCjr and aimed at teaching kindergarten and first grade children to read and write. IBM tested this software for two years in 225 schools around the country and enlisted the aid of Educational Testing Service, Princeton, N.J., to evaluate it before releasing Writing to Read as a product.

The company also introduced eight other educational packages for its PCjr, six of which were written by independent software companies and educators. The packages include a program created in-house that lets teachers design quizzes and tests and track student performance, and software called Rocky's Boots, an educational game developed by The Learning Company that teaches the basics of computer logic and electronic circuitry.

IBM VOWS TO MATCH PRODUCTS

IBM pledged to continue using third-party software developers wherever possible and to look for software that matches what educators are trying to teach in the classroom. "Our interest has been and will continue to be in software that is curriculum-based, that carries the content through the entire semester or year," says an IBM spokesman. In addition, the company believes that in-service training in the use of computers is critical for teachers. It has a video training service, as well as a major training center in Atlanta.

But Big Blue has a problem in this market. After dropping the price for a PCjr well under $1,000, upgrading its memory to 128K, and redesigning its keyboard, IBM pulled the plug on its low-end PC. The company announced last spring that it would stop manufacturing the machine. The announcement came just as PCjr began to attract some major school purchases, leaving educational buyers feeling confused, even betrayed. "The PCjr remains one of our key products in this marketplace," contends company spokeswoman Pam Evans. She adds that although the machine is no longer being made, IBM doesn't foresee that it will run out of its inventory in the near future.

Since the decision to drop jr, however, IBM has revised its strategy in this market. At the end of April, the company "consolidated its K-12 marketing effort" by forming an independent business unit, based in Atlanta and devoted to this field. Called IBM Educational Systems, the organization is led by James Dezell Jr., who is vice president of IBM's National Marketing Division and general manager of the new education organization. At the same time, IBM expressed its continued interest in this market by unveiling 24 educational software packages, including a 10-program Biology Series, a four-program Private Tutor Math Series, and a three-program Private Tutor Language Arts Series. All of this software was written in-house.

Industry observers say IBM has abandoned any attempt to sell standalone machines. The company is now said to be concentrating on selling large- and medium-sized processors to the schools for administrative applications. With enough processing power, these machines can also drive networks of, say, 30 Personal Computers. And in that mix of PCs, the company will continue to offer some PCjrs. IBM spokeswoman Evans acknowledges that "the key machine in the school district is the mainframe," but, again, stresses that PCjr is still IBM's machine in the classroom.

Of the systems approach, says one analyst, "certainly, IBM has sold computers this way forever, and it will work with educators, too." But most observers expect it to be a marketing approach that will require "a couple of years" to generate results.

Available now for more than a year and a half, Apple's Macintosh technology with its mouse, pull-down windows, and icons is "very appealing" to the schools, according to market researchers. In fact, Apple has succeeded in selling its innovative machine to several colleges, including Drexel University in Philadelphia. But industry observers agree that the company won't be able to sell the Mac at its current $1,800+ prices to elementary, junior, and high schools. Apple says it doesn't expect

WHAT'S NEXT FOR SCHOOLS

With the schools' lukewarm response to networking, two quite different technologies—videodisk and compact disk/read-only memory (CD-ROM)—are among the best bets for future sales to schools, say analysts who follow this emerging market. Both formats are essentially publishing media that make vast quantities of stored information easily available to students.

Videodisk is the older and more mature format and is leading the move into the educational marketplace. Education currently accounts for less than 10% of the videodisk market, according to Linda Helgerson, a McLean, Va., analyst who has recently published a study of the field, but she predicts a booming educational market in the future. "Educational uses of videodisk should grow to at least one fourth, probably one third, of the total market. After industrial training and point-of-purchase, education is going to be the next biggest application."

Videodisk offers educators the opportunity to store 54,000 still pictures, or motion video, or a combination of several media and narration. When hooked to a computer, the videodisk can become part of an interactive learning tool. But this is not simply programmed learning; the software can individualize the material and the speed at which it is presented.

More important for its chances of acceptance, an inexpensive player can be connected to any computer with an RS232 port. "The acceptance of videodisk hardware is totally dependent on the soft-

ware," says Helgerson. "Schools will purchase the systems when there is good software available. What we've had to date is a few—very fine, but only a few—attempts at producing videodisk-based software for the K-12 setting."

Facing the familiar chicken and egg problem, several nonprofit educational organizations are trying to prime the pump by funding and making available high-quality videodisk software.

The National School Boards Association (NSBA) has established an Institute for the Transfer of Technology to Education. One of institute's first jobs will be to obtain corporate funding for a series of science and technology videodisks that could be used in the classroom. NSBA plans to produce 20 lessons each on biology, chemistry, and physics. After the disks are completed, the product would be either given away to schools or licensed to a for-profit company to market.

NSBA is also seeking funding from the U.S. Department of Education for model centers that would compare technology-intensive education with conventional instruction.

How long will these pilot projects take to make a substantial difference in the market? Rockley Miller, editor of the *Videodisk Monitor* newsletter, thinks the effects will be seen in 18 months to two years. A change in demographics—"the baby boom boom that will produce more children under five in the coming years"—fewer teachers, and a talent drain on the teaching profession by private industry, all contribute to a coming crisis in education, says Miller. Schools will need to depend on technology as a result.

Anne Wujcik, director of educational research for Talmis, a New York-based subsidiary of International Data Corp., is more conservative. Schools are looking at videodisks and at CD-ROM, she says, but they are not ready to buy. The big change should happen when schools are ready to get rid of five-year-old Apples.

CD-ROM may have to wait for the next generation of computers for other reasons, as well. Brand-new in the marketplace, CD-ROM drives will not reach production quantities until next year (see "New Lights on the Storage Front," Sept. 15, p. 84-17). Almost all the interfaces and software currently prepared for CD-ROM are for connection with the IBM PC. Other interfaces are possible, of course, but the early marketing push has been to the business and vertical market, and IBM is the dominant force there. New machines, however, such as Commodore's Amiga with its sophisticated graphics, sound, and MS/DOS interface, may prove to be good candidates for applications using CD-ROM.

Several companies are trying to shorten the time lag between equipment introduction and the availability of good application products. Activenture of Pacific Grove, Calif., developed the software for Grolier Electronic Publishing's Academic American Encyclopedia on CD-ROM. Even with 21 volumes, index, and search software on a CD-ROM disk, there is still empty space on the disk—more than enough for a dictionary and a thesaurus, plus some word processing software or a spreadsheet. And Grolier executives are considering adding some or all of these features to the next version.

Atari used the encyclopedia on a disk as part of its demonstration in June of the new Atari 520ST. At the time, showgoers commented that the linking of the encyclopedia and the computer was the first good reason in a long time to buy a personal computer.

The economics of CD-ROM are its biggest advantage. As drives fall to less than $300 in oem quantities, schools may discover that the price of the drive and the disk is less than a traditional bound encyclopedia.

That type of linking spurs other companies as well. Compact Discoveries in Delray, Fla., is developing a whole series of application programs designed to be both low cost and consumer oriented. The idea is for computer or CD-ROM hardware manufacturers to give the programs away or charge a nominal fee for them when they sell the hardware.

In the future, educational publishers might consider reversing that idea—as a version of the free razor given away to prompt blade sales—and heavily discount sale of the CD-ROM hardware as a means of assuring steady sales of educational software on disk.

—Anne A. Armstrong

to win this market right away. Susan Talley, education program development manager at the company, says, "We think that as the Mac becomes a standard in colleges and universities, it will receive greater attention in secondary schools."

But other companies may well take the K-12 market first. Both Atari and Commodore have introduced Mac-like machines that are priced to be competitive with the Apple IIc and the IBM PC, let alone the Mac. They could find their way into the education market. Unveiled early in January, the Atari ST line (nicknamed the Jackintosh in honor of Atari chief Jack Tramiel) begins with a base price of $300 for 128K of main memory. With a single disk drive and low-cost color monitor, the 520ST sells for $800. Commodore, meanwhile, plans a fall market entry for its $1,295 Amiga personal computer, which includes a built-in drive and mouse. "We will definitely sell Amiga to the university market and expect the machine to find its way into K-12 schools [as we have had computer technology programs for a number of years," says Commodore's Walkington.

PRICE IS NOT ENOUGH

The potential of Mac technology for use in grades K-12 remains uncertain, though. Price alone is not enough. "Schools are leery about new machines," says Wujcik, "and the lack of educational software for the Mac and its look-alikes is a problem. Schools can't justify machines without software." Talmis anticipates that high schools will buy at least one Mac or its equivalent to experiment with the technology. But the market research organization does not expect to see the effect of these machines on the marketplace until the end of the 1985-86 school year.

Confirms Jane Manzelli, curriculum coordinator for computer science, K-12, in the public schools of Brookline, Mass., "The Mac is really a manager's tool. Schools just aren't that sophisticated." But other school officials disagree. Patricia Sturdivant, associate superintendent for technology in the Houston Independent School District, comments, "I think Apple's making a mistake by not trying to market the Mac to the schools. It's true it doesn't offer color or a reservoir of software, but there is definitely a place for it. A Mac would be a wonderful tool, for example, in an art or a journalism class." Commodore's Amiga and Atari's 520ST may find a home in large school districts like Houston's.

While the leading hardware companies in the education field are easy to spot, the top software firms are tougher to discern. To begin with, the makers of micros publish programs too. Tandy and IBM, for instance, both link hardware sales to the software that runs on their machines and

"Apple continues to consolidate its position in the school market."

are actively developing and licensing programs for this market.

The software companies most likely to succeed with educators will be those that move away from drill-and-practice programs toward packages that encourage children to be creative or that provide useful tools. Pamela Skinner, project director of Cupertino Concept: Computer Literacy, the Cupertino Union School District's program for putting micros in the schools, comments, "Much software still falls into the drill-and-practice category. But the wonderful side of computers is their ability to give children opportunities to develop critical thinking skills." Across the country, Manzelli of the Brooklin public schools adds, "We don't use any drill-and-practice programs except in special help classes. Our goal is to improve the thinking process in children."

Among the companies with a reputation for quality software are Sunburst, which writes programs such as Factory and Pond that teach perceptual thinking, and the Learning Company, author of Rocky's Boots. So successful has Intentional Educations Inc. of Watertown, Mass., been with its Bank Street Writer word processing package that other companies are now rushing to develop additional tools aimed at students and their teachers (see "DBMS for Kids," April 15, p. 70). Scarborough Systems Inc. of Tarrytown, N.Y., Grolier Electronic Publishing Inc. and Scholastic of New York City, have introduced database management programs and ready-made database files for children. And, following the example set by E. David & Associates of Storrs, Conn., with Kid Calc three years ago, Grolier made a spreadsheet for children available in April. "These kinds of tools are currently *the* software products in this market," says Wujcik.

The software firms that will do well in the school market also will be those that reach agreements with the traditional textbook publishers that teachers recognize and respect. IBM, for example, has a "joint marketing venture" with Prentice-Hall in Englewood Cliffs, N.J., to publish workbooks to go with software written for IBM's PC family. The five-year-old Learning Company has signed a marketing agreement with Addison-Wesley, Reading, Mass., that calls for the book publisher to distribute several of the software firm's titles in packages specifically directed at the schools. And Software Publishing Corp. of Mountain View, Calif., well known for its "pfs" business software, has reached an agreement with Scholastic whereby the education publisher will market pfs to schools.

MAY AVOID EDUCATION MARKET

Without such connections, some software firms may even avoid the education market. Though praised for the quality and creativity of its programs, for instance, Spinnaker Software Corp. of Cambridge, Mass., has no intention of pursuing the field other than on the periphery. President C. David Seuss figures that a built-in distribution channel or a direct sales force already selling to the schools is essential to compete in any cost-effective way.

Another issue facing the schools is whether to network their microcomputers.

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It happens in children as well. Things like rheumatic heart disease and congenital heart defects. Each year, nearly one million Americans of all ages die of heart disease and stroke. And 20,000 of them die from childhood heart diseases.

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Thus far, there appears to be little networking going on, although observers predict such links will increase with the population of micros in classrooms. "The concept interests people, but most schools don't buy enough equipment at any one time to network," says Acorn Computer's Murphy. He believes that no more than 10% to 12% of the education market is seriously interested in networking right now. To network cost-effectively, schools need a minimum of eight or nine personal computers, and Quality Education Data Inc. of Denver, estimated at the beginning of the 1984-85 session that 15,000 public schools had that capability. Still, "if the use of computers in the schools is to grow, we will have to be able to use networks," says educator Sturdivant, who has field tested four networks and has yet to find a satisfactory communications solution for her school district's population of some 6,500 microcomputers.

Some schools, such as those in Brookline, have networked from the beginning. Brookline has eight schools, each with its own Corvus Systems network linking Apple II+ and IIe micros and a Hewlett-Packard mainframe in the high school. By pioneering in this way, the school district has encountered two major problems that are likely to limit the growth of education networks for some time: the availability of software that can be networked and the price for the packages that can be linked. "None of the straight drill-and-practice, computer aided instruction stuff can be networked," says Manzelli. That's another reason why the Brookline schools have stayed away from such packages.

In general, Manzelli has not found manufacturers "too responsive to our networking needs." Price is a major factor, she says. "Networked software tends to be outrageously expensive. Publishers want to charge between $400 and $700 per net for one package. We have to really want a program to pay that much." There are exceptions, however. The Brookline schools currently are pilot testing a networked version of Bank Street Writer, for example.

One of the rationales behind the high prices set by manufacturers is that schools are major sites for pirating software. Even though Spinnaker, for example, sells 95% of its products into the home, 75% of its piracy cases come from educational institutions. Faced with limited budgets, teachers have photocopied magazine articles and book chapters for years; now they are duplicating disks.

Piracy makes it tough for publishers to get the return they need on their investment in software—and costs sometimes run as much as $100,000 for a single program. Networking seems to these manufacturers to create an identical problem of recouping research and development costs. Hardware makers, meanwhile, are elated at the potential that networks hold for the use by the schools of more and more machines. To them, networks will be a boon. ●

An independent survey of DATAMATION's readers reveals that almost half of those polled do some of their work at home.

DO YOU TELECOMMUTE?

by Margrethe H. Olson

Who is telecommuting? Why? Last winter we conducted a survey of DATAMATION readers to answer these questions. The majority of articles about telecommuting have focused on people in the computer-related professions, under the basic assumption "have terminal, will travel." In other words, if you can do all your work from home once you have a terminal or personal computer and modem, why not work there? Assuming the jobs of many DATAMATION readers would lend themselves to telecommuting at least some of the time, we conducted a survey to find out if anyone is taking advantage of this flexible work option.

The answer is . . . yes and no. People in the computing professions are working as much as ever. And now some of the overtime work that previously had to be done in the office can be done at home. But people are not staying home instead of going into the office, at least not yet.

The survey questionnaire was sent to 5,000 readers; 958 were returned. Of these, 45%, or 434 respondents, claimed to do at least some of their work at home. Of those who did not work at home, the large majority, 60.5%, or 358 people, said they would like to work at home at least some of the time. A total of 97, or 16.4% of the respondents, said they did not want to work at home at all. We can assume that more people who do work at home were motivated to complete the survey than those who do not, although responses from both groups were requested.

The remainder of the results are reported only for those who work at home.

Although 28.1% of the respondents either classified their occupations as "other" or did not respond, the rest provided their occupations and the results are shown in Fig. 1. As many as 39% reported they have some dp management responsibility, 25.8% are computer professionals, and 7.1% reported other professions. As shown in Fig. 2, 35% of those who work at home are self-employed.

FIG. 1
RESPONDENTS' OCCUPATIONS

	Number	Percentage
Other*	122	28.1
Executive dp management	108	24.9
Midlevel dp management	61	14.1
Nonmanagerial computer professional	12	25.8
Other non-computing professional	31	7.1

*Includes those giving no response

FIG. 2
When you are working at home, are you:

	Number	Percentage
Employed by a company or another person	219	50.5
Self-employed	151	34.8
Other	64	14.8

FIG. 3
Which type of computer equipment do you have at home for work-related use?
(Respondents gave multiple answers.)

	Number	Percentage
Personal computer	303	69.8
Modem	187	43.1
Terminal	122	28.1
Word processor	69	15.9

Is work at home a significant departure from the daily commute to a nine-to-five workplace? We learned that our respondents, like most computing professionals, work long hours. What is most interesting, however, is that although the average number of hours worked at home is equivalent to one and a half work days, the hours appear to be worked in addition to regular work hours. Most people have a terminal or personal computer at home and many have the capability to communicate with the company's in-house computer (see Fig. 3 for type of equipment respondents used at home). It appears that the one significant change in work habits is that overtime work can now be done in the convenience of one's home instead of at the office. This was true for both the self-employed and the employees; self-employed persons reported working 51.5 hours per week, 15 of them at home, as opposed to employees, who reported an average of 52.7 hours worked, 10.7 of them at home.

Fifty percent of respondents have a separate office at home (see Fig. 4) so they can work conveniently and relatively free from distractions.

Fig. 5 shows clearly that work at home is an addition to the regular workday. Only 12% of respondents stay home occasionally instead of going to the office, and only 10% work at home on a regular basis as a substitute for the office. Only 6% work exclusively at home. (It is not clear how a person who uses the home as a base but works primarily in the field, such as a salesperson, would respond to this question.)

Why did the respondents decide to work at home? As shown in Fig. 6, the reason most frequently given was to increase their productivity. Whether they found the office too distracting, were worried about not getting enough work done, or were constantly on deadlines, they chose to extend

their day at home to get more work accomplished. It can be assumed that they were not paid overtime for the hours that they worked at home.

FEW EARN EXTRA MONEY

Some of the respondents (31%) reported that they were earning extra money working at home. There has been some concern that having computer equipment at home might encourage employees to use it to moonlight for competitors. Anecdotal evidence does not show this to be a serious problem. Rather, many programmers work on their own products, each presumably hoping to make a hit with the next Lotus 1-2-3.

How do those polled like working at home? As shown in Fig. 7, 67% felt the opportunity to work at home did indeed increase their personal productivity. This result must be considered with caution. Strictly speaking, productivity is output per unit of input (hours worked), and the respondents may simply be extending their hours worked rather than increasing their output per hour. Interviews with people who work at home, however, show they do feel their actual productivity has increased due to the lack of distractions and interruptions in the home environment. Another reason is the increased leverage gained from being able to try any function, such as a program fix, at any time.

Almost 36% reported they also spent more time with their families when working at home. (It should be noted, however, that 64.3%, or 279, of the respondents had no children under five, and of those that did, only 3.7%, or 16 took care of them while they worked.) The rest of the home workers, 32% (139), did not spend any more time with their families. Instead, they preferred doing their overtime work at home just so they could share regular meal time with their families and be physically present in the evening hours, even though toiling over their terminals.

Work at home is not ideal. Fig. 8 shows its most frequently cited disadvantages. The biggest problem mentioned in the interviews is the tendency to work too much. The terminal or computer is close and inviting, and it's easy to put in just one more test run before going to bed. Electronic mail adds to this problem. We have been told of people turning on their terminals just to see who is on the system. The productivity benefits cited go hand in hand with this downside because the machine itself and the accessibility it provides the at-home worker are compelling.

Another frequently cited disadvantage of work at home is a lack of interaction with coworkers. The myth that programmers are solitary types, preferring their terminals to other people, has pretty much been dispelled over the years. In fact, programmers are very social types, and a primary topic of their conversation is how to use their computers. Thus, an important part of their learning and professional development is constant interaction with peers, and this is missed when work is done at home.

Overall, however, those who work at home seem to feel the advantages of having the option to work at home outweigh the disadvantages. As shown in Fig. 9, over 85% are at least somewhat satisfied with the opportunity to work at home. They do not want to work at home full-time, however, as shown in Fig. 10. The overwhelming majority favor the flexibility of being able able to work at home part-time but still work at a regular workplace.

FIG. 4

Where in your home do you most often work?

	Number	Percentage
Office in my home	217	50.0
Dining/living room	55	12.7
Family room	43	9.9
Bedroom	36	8.3
Basement	19	4.4
Kitchen	16	3.7
Other/no response	48	11.0

FIG. 5

Are the hours that you work at home:

	Number	Percentage
In addition to regular work hours	280	64.5
An occasional substitute for work at another location	54	12.4
A regular substitute for work at another location	43	9.9
All the paid work you do	27	6.2
Other/no response	30	6.9

FIG. 6

Why did you first decide to work at home?
(Respondents gave multiple answers.)

	Number	Percentage
To increase my productivity	244	56.2
To work in my own way, at my own pace	200	46.1
To earn extra money	135	31.1
To save time commuting	93	21.4
Tax benefits	62	14.3
To ease conflicts between work and family	61	14.1
Low overhead	48	11.1

FIG. 7

What are the advantages of working at home?
(Respondents gave multiple answers.)

	Number	Percentage
Increased productivity	291	67.1
More time with my family	155	35.7
More time to myself	134	30.9
More money	113	26.0
Increase career opportunities	88	20.3
Less personal conflict	61	14.1
Spouse pleased	59	13.6

Most respondents to the survey are male—89.6%, or 389 respondents, vs. 10.3%, or 45, female. A majority of the respondents—82.9% (360)—are married or living with a partner, while 17.1% (74) are divorced, widowed, or single. Fig. 11 shows the household income of the respondents.

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Based on this survey, is telecommuting common? In the computing profession, the one significant change in telecommuting in recent years seems to be that more people have access to computing in their homes, which makes it easier for them to put in longer hours. This is an interesting cultural phenomenon, but it does not mean that the office as we know it is disappearing and being replaced by electronic cottages. In the computing professions at least, work at home is a privi-

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People who have the option to work at home seem to feel the advantages outweigh the disadvantages.

FIG. 8

What are the disadvantages of working at home?
(Respondents gave multiple answers.)

	Number	Percentage
Work too much	173	39.9
Lack of interaction with co-workers	155	35.7
Less time to myself	72	16.6
Less time with my family	53	12.2
Resentment of my spouse	46	10.6

FIG. 9

Overall, how satisfied are you working at home?

	Number	Percentage
Very satisfied	211	48.6
Somewhat satisfied	159	36.6
Somewhat dissatisfied	24	5.5
Very dissatisfied	3	0.7
No response	37	8.5

FIG. 10

What would be your ideal work arrangement?

	Number	Percentage
To work part-time in my home, part-time outside	309	71.2
To work only in my home	44	10.2
To work entirely outside my home	38	8.8
Other	43	9.9

FIG. 11

What is your household income?

	Number	Percentage
$45,000-59,999	129	29.7
$30,000-44,999	111	25.6
$75,000 and over	82	18.9
$60,000-74,999	78	18.0
$15,000-29,999	24	5.5
No response	10	2.3

lege. It is voluntary and convenient. People do it because they like what they do and are happy to do it at home as well as at the office.

Although this conclusion is tentative, previous research shows that the technology to support telecommuting seems to be a limiting factor today. Despite having the use of personal computers and access to mainframe databases through dial-up lines, we do not work in an environment where all the resources we needed, including people, are accessible electronically. When electronic mail and voice store-and-forward become widespread, and most text-based resources (e.g., manuals, documentation, correspondence) become available on-line, more and more jobs in computing and other white-collar professions will become "location independent." At that point, we may see work at home, at least as an occasional substitute for working in the office, become commonplace.

Today, a significant barrier to regular work at home is lack of exposure to corporate culture. Employees need to feel a sense of belonging that is gained by walking through the office doors. More important, managers like to see their employees. A common complaint from managers regarding telecommuting employees is, "How do I know they're working if I can't see them?" One might ask, how do you know even when you can see them? ◉

Margrethe H. Olson is associate professor with the Graduate School of Business Administration at NYU. During the past four years, her research on telecommuting has focused on formal company arrangements for employees to work at home on a regular basis. She has surveyed a number of such programs through interviews with employees working at home and their management. Olson is currently completing a corporate telecommuting study sponsored by the National Science Foundation.